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An Annotated Bibliography of the Bronzed Cutworm

Nephelodes minians Guenée

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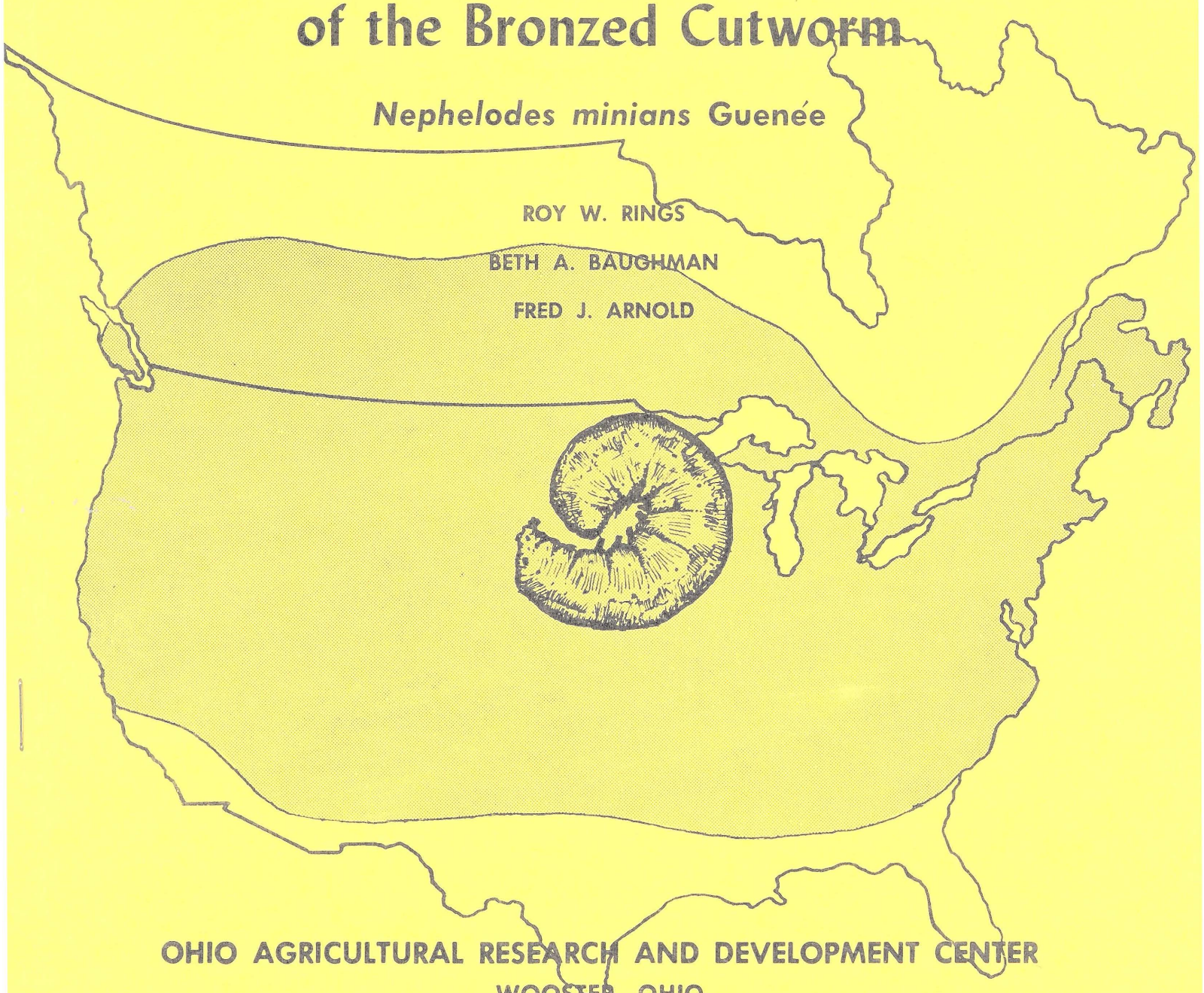

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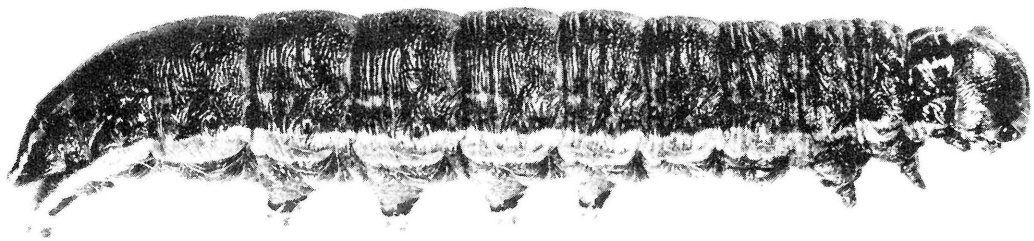

Bronzed Cutworm, Nephelodes minians Guenee

AN ANNOTATED BIBLIOGRAPHY OF THE BRONZED CUTWORM, *Nephelodes minians* Guenée

Roy W. Rings[1], Beth A. Baughman[2], and Fred J. Arnold[2]

INTRODUCTION

The purpose of this circular is to consolidate the abstracted North American literature on the bronzed cutworm, *Nephelodes minians* Guenée. This species occurs throughout the United States and southern Canada, but it is most abundant from Missouri to Maine and from Minnesota to West Virginia. The species has occurred in outbreak proportions at infrequent intervals on important agricultural crops.

This species was originally described by Archilles Guenée in 1852 from specimens collected by Boisduval and Guenée in boreal America. Guenée also described *Nephelodes violans* as a distinct species in 1852, but most lepidopterists consider *violans* as only a dark phase of *minians* with strongly violet, and often almost blackish, median areas. The type specimens are in the British Museum. Other synonyms of *minians* are *Nephelodes emmedonia* Cramer, *expansa* (Walker), *sobria* (Walker) and *subdolens* (Walker).

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The bronzed cutworm was reported by Forbes (1904) to cause severe damage to grass in New York in 1881. This cutworm caused unprecedented destruction in 1886 near Columbus, Ohio, where, late in May, scarcely an acre of meadow or pasture had a vestige of grass on it for a distance of several miles, many fields being dry enough to burn. About 3,000 acres were thus destroyed, the larvae migrating en masse when their food was exhausted. Gillette (1891) considered the bronzed cutworm, next to the glassy cutworm, as the most abundant corn and grass cutworm in Iowa. Gorham (1935) reported on serious outbreaks of this species on the Tantramar dyke-lands, New Brunswick, in 1921, 1922 and 1923 and again in 1928, 1929 and 1930. The bronzed cutworm was particularly abundant in pasture fields in 1926 and 1927 in Iowa, stated Curtiss (1929).

The larva of the bronzed cutworm can be easily recognized by the seven longitudinal stripes on the body. There are four wide brown stripes and alternating with these, three narrower yellow ones. The head and cervical shield are yellowish-gray. The general color of the body is dark brown with a bronzy sheen. Complete descriptions of the moth are given in Forbes (1954) and the moth is shown in color in Holland (1903) Plate 24, figure 33.

The bibliographical information was obtained by a thorough search of the libraries at The Ohio State University and the Ohio Agricultural Research and Development Center for the years 1869 to 1973. The authors have established a profile on the bronzed cutworm in cooperation with the Mechanized Information Center of The Ohio State University Libraries. This computerized system of retrieval will aid in keeping this bibliographical information current. Supplementary bibliographical data on the

bronzed cutworm will be summarized yearly and will be available on request from the Ohio Agricultural Research and Development Center.

The preparation of this bibliography is only a part of an extensive, multi-state, research program supported by grants from the Cooperative State Research Service and the federal Environmental Protection Agency. This is a regional research project entitled "Bionomics and Management of Soil Arthropod Pests."

Entries are listed alphabetically by author except in cases where the publication is anonymous or more likely to be identified with a governmental agency under which it was published. The abbreviations in the citations follow the American standard for periodical title abbreviations which was published in Biological Abstracts 45(13):4347-4361. All references in this publication deal with the bronzed cutworm; however, the scientific name which is used in a given article is also used in the annotation so that there is no question as to the species which is being cited. The number in parentheses following the annotation represents the page number which includes information on the bronzed cutworm if it is different from the citation page numbers.

THE CANADIAN AGRICULTURAL INSECT PEST REVIEW

This publication aims to present, in manuscript form, a periodical statement on current insect pest conditions. It presents data governing the seasonal appearance of insect pests, the effects of winter, degrees of parasitism, notes on distribution and abundance of insect pests. It has been published by the Canada Department of Agriculture, Research Branch-Scientific Information Section, Ottawa, Ontario, from 1923 to present. From 1923 to 1967 this publication was known as The Canadian Insect Pest Review.

1929. Can. Insect Pest Rev. 7.

Cutworms, of which the dominant species is the bronzed cutworm, averaged about 16 to a square foot of sod in the Tantramar marshes, Sackville, New Brunswick (14).

1930. Can. Insect Pest Rev. 8.

Indications hint of a probable abatement of the outbreak of the bronzed cutworm which was affecting couch grass and timothy in the Tantramar dykelands, New Brunswick (18).

1935. Can. Insect Pest Rev. 13.

On the Tantramar dykelands, New Brunswick, signs of the bronzed cutworm were detected, possibly indicative of the beginning of another of the periodical outbreaks common in that region (33). Examination of ten one-half square foot sods from as many different locations on the Tantramar dykelands, New Brunswick, collected May 10, revealed a total of 53 hatched eggs and 17 larvae of the

bronzed cutworm, equal to 11.8 eggs per square foot, and 3.4 larvae per square foot surviving the winter. The last general outbreak occurred in the years 1927 to 1931 (82). The bronzed cutworm has appeared in outbreak form on the Tantramar marshes near Amherst, New Brunswick and some areas have been laid bare by their feeding. This is the first year of a general outbreak of the bronzed cutworm on dyked meadows of Westmorland and Cumberland counties, New Brunswick. About 1000 acres of grass land were severely damaged (119-120).

1936. Can. Insect Pest Rev. 14.

The bronzed cutworm was destructive to grasses in parts of Westmorland County, New Brunswick, and Cumberland County, Nova Scotia (2-3). The bronzed cutworm was present in outbreak form on the Tantramar marshes near Amherst, New Brunswick, where heavy losses resulted to the hay crop (21). The bronzed cutworm developed in outbreak form in portions of Westmorland County, New Brunswick and Cumberland County, Nova Scotia, causing destruction of grass on some 2000 acres of meadow land (23). The sod examination in New Brunswick revealed living larvae of three species other than the bronzed cutworm, Nephelodes emmedonia Cram. Seventy-seven living larvae and 132 eggs and egg shells of the bronzed cutworm were found in sample sods from dykelands in the valleys of the Missiquash, Aulac, Tantramar,

Memramcook and Petiticodiac Rivers, New Brunswick. Bronzed cutworms injured about 1000 acres of grass at Sackville, New Brunswick (79). The bronzed cutworm, Nephelodes emmedonia Cram., was in outbreak form, during June, on an area of about three square miles in the Midgic section of the Tantramar dykelands, New Brunswick, with scattered local outbreaks in the valleys of the La Planche, Missiquash, Aulac, Memramcook and Petiticodiac Rivers. The total area infested was probably seven square miles. Extensive plowing of old meadows and an epidemic of disease helped to lessen infestation and killed almost all of the caterpillars (123).

1937. Can. Insect Pest Rev. 15.

The bronzed cutworm, Nephelodes emmedonia Cram., was present in large numbers on certain sections of the Tantramar dykelands and on similar meadows in the valleys of the Memramcook and Petiticodiac Rivers, New Brunswick (2).

The bronzed cutworm was plentiful on the Tantramar marshes, New Brunswick, early this year but was destroyed in large numbers and greatly reduced by wilt disease (20).

The bronzed cutworm, Nephelodes emmedonia Cram., was present in very large numbers on certain sections of the Tantramar dykelands and on similar meadows in the valleys of the Memramcook and Petiticodiac Rivers, New Brunswick. The local centers of abundance were scattered and generally small. The largest area

stripped by the insects was near the Midgic settlement, where some three square miles of grassland was in large part destroyed. An outbreak of a fungous disease destroyed a large part of the insects in the area (22). There is a small area of infestation of the bronzed cutworm, Nephelodes emmedonia Cram., along the West Midgic Road, Westmorland County, New Brunswick. Probably this is the closing year of the 1935-36-37 outbreak. The infestation was in the northwest corner of the marsh land where the previous two outbreaks were most prevalent (107).

1938. Can. Insect Pest Rev. 16.

The outbreak of the bronzed cutworm, Nephelodes emmedonia Cram., which occurred on the Tantramar marshes at the head of the Bay of Fundy, in the Maritime Provinces, in 1935 and 1936, in New Brunswick, appears to have terminated as this species was of no importance in 1937 (4).

The bronzed cutworm, Nephelodes emmedonia Cram., was of no importance on the Tantramar marshes, New Brunswick, in 1937 in contrast to the extensive damage that occurred in 1936 (21).

1939. Can. Insect Pest Rev. 17.

The bronzed cutworm, Nephelodes emmedonia Cram., a pest of dykeland grass caused no injury this year. A search of the meadows in June and examination of sod samples in April and November showed that it was only present in small numbers. The autumn samples

showed a slight increase in abundance over the previous year in New Brunswick (26).

1941. Can. Insect Pest Rev. 19.

The first outbreak of the cutworm, Nephelodes emmedonia violans Hbn., in 40 years was reported from Connecticut (170). Scattered infestations of the bronzed cutworm, Nephelodes emmedonia Cram., were found at the following places: Dixon Point Marsh, East Midgic, the Commons Marsh, Upper Sackville Marsh, Lower Sackville Marsh, Coles Island Marsh, Aulac, Missiquash Valley in New Brunswick; Fort Lawrence, Amherst, Stephenson Road and Nappan Marshes in Nova Scotia. Serious outbreaks have occurred at six and seven year periods in the past. These outbreaks probably mark the beginning of the next cycle of abundance (183).

1942. Can. Insect Pest Rev. 20.

In New Brunswick, cutworms were numerous in a few localities, especially in gardens and there were local outbreaks of the bronzed cutworm, Nephelodes emmedonia Cram., in bent grass (3).

On the dyked marshlands at the head of the Bay of Fundy, the bronzed cutworm, Nephelodes emmedonia Cram., occurred in outbreak numbers. Localized fields of grass were damaged at different places from River Herbert in Cumberland County, Nova Scotia, to Midgic in Westmorland County, New Brunswick, a distance of about 20 miles. None of the local centers of

infestation and severe damage were more than 100 acres and most of them smaller than 40 acres (143).

A bronzed cutworm, Nephelodes emmedonia violans Guen., caused considerable damage to grass in Connecticut (184).

1943. Can. Insect Pest Rev. 21.

The bronzed cutworm, Nephelodes emmedonia Cram., developed in local outbreak abundance at a number of places on the dyked marshes about the head of the Bay of Fundy, New Brunswick. These local outbreaks caused damage to grass on areas varying from one to fifty acres (19).

1954. Can. Insect Pest Rev. 32.

A light infestation of the bronzed cutworm, Nephelodes emmedonia Cram., was observed in a hay meadow at Cow Bay, Halifax County, Nova Scotia (131).

1955. Can. Insect Pest Rev. 33.

A light infestation of the bronzed cutworm, Nephelodes emmedonia Cram., was seen in a hay field at Cow Bay, Halifax County, Nova Scotia. Elsewhere in western Nova Scotia the insect was rare (114).

The population of the bronzed cutworm, Nephelodes emmedonia Cram., in the Cow Bay area of Halifax County, Nova Scotia this season remained at the same low level which has existed over a period of five years (172). The population of the bronzed cutworm, Nephelodes emmedonia Cram., in grasslands at Cow Bay, Halifax County, Nova Scotia remained at a low level as in the previous five years (341).

1956. Can. Insect Pest Rev. 34.

As has been the case for the last five years, the population of the bronzed cutworm, Nephelodes emmedonia Cram., in grassland at Cow Bay, Halifax County, Nova Scotia, remained at a low level (116). Injury to grass in the Cow Bay area of Halifax County, Nova Scotia by the bronzed cutworm, Nephelodes emmedonia Cram., has continued to be very light for the sixth consecutive year (164).

1957. Can. Insect Pest Rev. 35.

As has been the case for the past six years, the population of the bronzed cutworm, Nephelodes emmedonia Cram., in grassland at Cow Bay, Halifax County, Nova Scotia, remained at a low level (105). In a survey of one 12-acre field of grass, the bronzed cutworm, Nephelodes emmedonia Cram., which has occurred sparsely in this area for the past six years, was discovered to be increasing to a moderate infestation. The population density was estimated to be about one larva per square foot (161).

1958. Can. Insect Pest Rev. 36.

The bronzed cutworm, Nephelodes emmedonia (Cram.), which has occurred sparsely in the Cow Bay, Halifax County, Nova Scotia, area for the past six years increased to a moderate infestation. The population density was estimated to be about one larva per square foot (108). The bronzed cutworm, Nephelodes emmedonia Cram., was present in grasslands

in the Cow Bay area of Halifax County, Nova Scotia, in numbers comparable to last year, when a moderate outbreak occurred (161).

The bronzed cutworm, Nephelodes emmedonia Cram., was observed in unusually large numbers in lawns and on wasteland grasses in the Hamilton Ave. - Cornwall Crescent area of St. John's, Newfoundland, on June 20-21 (193).

1959. Can. Insect Pest Rev. 37.

At Cow Bay, Halifax County, Nova Scotia, the bronzed cutworm Nephelodes emmedonia (Cram.), was as abundant as last year, when a moderate outbreak occurred (104).

The bronzed cutworm, Nephelodes emmedonia (Cram.), appeared in unusually large numbers in fields near the Hamilton Avenue section of St. John's, Newfoundland (117).

The bronzed cutworm, Nephelodes emmedonia Cram., was much less numerous in grasslands at Cow Bay, Halifax County, Nova Scotia, than it has been for two years. It was occasionally found at North East Margaree, Inverness County, Nova Scotia (171).

1960. Can. Insect Pest Rev. 38.

The bronzed cutworm was less numerous in Halifax County, Nova Scotia (93) and small numbers were present in hayfields near Kentville, Nova Scotia (112).

Bronzed cutworms were taken at light traps in Chatham, Ontario (223-224).

1961. Can. Insect Pest Rev. 39.

The bronzed cutworm appeared in low numbers in Kings, Lunenburg and Halifax Counties in Nova Scotia (90) and was moderate in grasslands at Cow Bay, Nova Scotia (163, 372).

Bronzed cutworms were taken at light traps in Chatham, Ontario (209).

1962. Can. Insect Pest Rev. 40.

The bronzed cutworm appeared in small numbers in grasslands in North East Margaree, Cape Breton Island, Nova Scotia (76, 255).

1964. Can. Insect Pest Rev. 42.

The bronzed cutworm, Nephelodes emmedonius (Cramer), was present in unusually small numbers in grasslands in Halifax and Yarmouth counties in Nova Scotia (78).

Many lawns in Saskatocn, Moose Jaw and Regina, Saskatchewan, were again attacked by the bronzed cutworm, Nephelodes emmedonius (Cramer) (176).

The bronzed cutworm, Nephelodes emmedonius (Cramer), was present in low numbers in grasslands in Halifax and Yarmouth Counties in Nova Scotia (212).

1965. Can. Insect Pest Rev. 43.

The bronzed cutworm, Nephelodes emmedonius (Cramer), appeared in normal numbers, causing slight damage to hayland at Cow Bay, Halifax County, Nova Scotia (44).

The bronzed cutworm, Nephelodes emmedonius (Cramer), was present in moderate numbers in Halifax and Yarmouth counties in Nova Scotia (238).

1971. Can. Insect Pest Rev. 49.

About five acres of grasslands in Albert County, New Brunswick, (south of Moncton) was stripped by eight to twelve bronzed cutworm (Nephelodes minians Guenée) larvae per square foot (7). The bronzed cutworm attacked all types of garden vegetables in the Conception Bay area of Newfoundland. Attacks occurred from early June through to late July (18).

Crumb, S. E. 1926. The bronzed cutworm (Nephelodes emmedonia Cramer) (Lepidoptera). Proc. Entomol. Soc. Wash. 28(9):201-207.

Descriptions are given of the egg, larva, pupa and adult. The author considers the species to be limited to the northeastern section of the U.S. east of the Rocky Mountains (202, 205).

Crumb, S. E. 1956. The larvae of the Phalaenidae. U. S. Dep. Agr. Tech. Bull. 1135:1-356.

A complete description of the bronzed cutworm larvae is given. Nephelodes emmedonia is generally distributed east of the Rocky Mountains (152).

Curtiss, C. F. 1927. Entomology. Iowa Agr. Exp. Sta. Rep.:1-63.

Bronzed cutworms were abundant in pasture fields in Iowa in 1926 (35).

Fernald, C. H. 1893. The entomological division. Fifth Annu. Rep. Mass. Hatch Exp. Sta.:148-151.

A brief description of the bronzed cutworm is given. Paris green was suggested for control (150).

Forbes, S. A. 1904. The more important insect injuries to Indian corn. Ill. Agr. Exp. Sta. Bull. 95: 331-399.

A description of appearance and life history of the

bronzed cutworm are given (359-360).

Forbes, W. T. M. 1954. Lepidoptera of New York and neighboring states. Cornell Exp. Sta. Memoir. 329:1-433.

This publication presents keys to the subfamilies, genera, and species of noctuid moths. A brief description is given of the larva and geographical distribution. A complete description of the adult stage is presented (101).

French, G. H. 1878. Economic entomology of Illinois. Part II. Lepidoptera or butterflies and moths and their larva, or caterpillars. 7th Rep. Ill. State Entomol:135-273.

Refers to the bronzed cutworm as the violet nephelodes - Nephelodes violans Gn. The author describes the host range, habits, appearance of larvae and adults (220).

French, G. H. 1878. Notes on the larva and chrysalis of Nephelodes violans. Can. Entomol. 10:61.

The larva and pupa of Nephelodes violans (=minians) are described.

Friend, R. B. 1942. Connecticut state entomologist, forty-first report, 1941. Bull. Conn. Agr. Exp. Sta. 461:463-548.

For the first time in 40 years, there was a serious outbreak of bronzed cutworms in Connecticut (465). Cutworms in larval stage were subject to attack by disease or parasites (542-543).

Frost, S. W. 1955. Cutworms of Pennsylvania. Penn. Agr. Exp. Sta. Bull. 596:1-29.

Bronzed cutworms are primarily pests of corn, grains and grasses. Larvae are true cutworms. Because of distinct body markings the larva is one of the easiest cutworms to recognize (22-23).

Garman, H. 1895. Cutworms in Kentucky. Bull. Ky. Agr. Exp. Sta. 58:89-109.

This bulletin lists a description of 12 cutworms common to Kentucky. The spring of 1895 brought an abundance of cutworms into gardens and fields. The use of several methods for removing the cutworms are cited. Also discussed are cutworm diseases and enemies.

Garman, H. 1920. Observations on the structure and coloration of the larval corn-ear worm, the bud worm and a few other lepidopterous larvae. Ky. Agr. Exp. Sta. Bull. 227:53-84.

Coloration, variation and structure of an insect may be useful in determining its place among the species of its genus and in the family Noctuidae. Nephelodes emmedonia has an areolate cuticle.

Gibson, A. 1915. Cutworms and their control. Can. Dep. Agr., Entomol. Research Bull. 10:1-31.

This article gives a general description of the bronzed cutworm appearance. For the most part, it is a grassfeeding species (29).

Gillette, C. P. 1891. Notes and experiments upon injurious insects and insecticides. Iowa Agr. Exp. Sta. Bull. 12: 505-562.

The bronzed cutworm was the second most abundant corn and grass cutworm in central Iowa. Not many bronzed cutworms laid their eggs before the first of September.(544).

Godfrey, G. L. 1972. A review and reclassification of larvae of the subfamily Hadeninae (Lepidoptera, Noctuidae) of America north of Mexico. U. S. Dep. Agr. Res. Service Tech. Bull. 1450:1-265.

A description of the bronzed cutworm larva is given (15). A partial reference list of the hosts of this species is given (16). The bronzed cutworm is distributed generally east of the Rocky Mountains between 35° and 50° north latitude (16).

Gorham, R. P. 1935. The bronze cutworm, Nephelodes emmedonia Cram., in the Maritime Provinces. Entomol. Soc. Ont. Rep. 66:56-58.

A history of the occurrence of bronze cutworm on the Tantramar dykelands from 1860 to 1936 is given (56-57).

Gossard, H. A. 1917. Cutworms, their habits, characteristics and means of control. Mon. Bull. Ohio Agr. Exp. Sta. 3:85-90.

Characteristics of the life cycle and ways of controlling the bronzed cutworm are discussed (85,89). The bronzed cutworm is marked with broad, bronze stripes, alternating with narrower yellowish ones. A pale stripe extends down the middle of the back and there is a pair of similar ones on each side (87).

Grote, A. R. and C. T. Robinson. 1868. Notes on the North American Lepidoptera in the British Museum and described by Mr. Francis Walker. Trans. Amer. Entomol. Soc. 2:67-88.

Part IX. - 1856. Graphiphora expansa Walker., p. 399 = Nephelodes minians Guenée (78).

Guenée, A. 1852. Species général des Lepidoptéres. Noctuelites 1:130.

Nephelodes minians Gn. and Nephelodes violans are listed (130). These are synonyms.

Hardy, G. A. 1954. Notes on the life history of the shaded umber

Nephelodes emmedonia (Cram.) race pectinata Sm. Lepidoptera: Phylaenidae. Proc. Entomol. Soc. Brit. Columbia. 50:15-16.
A description of the early stages, the behavior of the larva and the food plants are given for the bronzed cutworm Nephelodes emmedonia.

Hawkins, J. H. 1930. Tarsal claws of noctuid larvae. Ann. Entomol. Soc. Amer. 23:393-396.
The claws of Nephelodes emmedonia were measured and the ratios of the various parts of the claw are presented in a table.

Holland, W. J. 1968. The moth book. A guide to the moths of North America. Dover Publ., Inc., New York. 479 pp.
(1) Nephelodes minians Guenee, Plate XXIV, Fig. 33 Syn. expansa Walker; sobria Walker; violans Guenée; subdolens Walker. A common species in the Atlantic States. It is abundant in the fall of the year in western Pennsylvania (199-200).

Hughes, K. M. 1957. An annotated list and bibliography of insects reported to have virus diseases. Hilgardia. 26(14):597-629.
By 1954, over 150 insect species were known to suffer from virus diseases. Almost all entries have a notation of the type of virus disease. When possible, a distinction is made between nuclear polyhedroses and cytoplasmic polyhedroses. Six references to the virus disease common to Nephelodes emmedonia are given (605).

Johnson, J. P. 1942. The bronze cutworm. Conn. Agr. Exp. Sta. Bull. 461:463-548.

The occurrence of bronzed cutworms in Connecticut causing damage to grass is the first such outbreak in more than 40 years (542-543).

Johnson, J. P. 1943. The bronze cutworm. Conn. Agr. Exp. Sta. Bull. 472:1-315.

Bronzed cutworm populations were down in 1941 because of wilt disease (306).

Kelsall, A. and H. T. Stultz. 1937. Pyrethrum and derris dust. Rep. Entomol. Soc. Ont. 67:20-29.

Pyrethrum 30 per cent is much more toxic to Nephelodes emmedonia Cram. than derris 10 per cent (22).

Knutson, H. 1944. Minnesota Phalaenidae (Noctuidae). The seasonal history and economic importance of the more common and destructive species. Minn. Agr. Exp. Sta. Tech. Bull. 165:1-128.

This bulletin discusses the seasonal activity and economic importance of the bronzed cutworm in Minnesota. The overwintering stage appears to be the egg and small larva. There was practically no variation in seasonal appearance of the flights. Most records of this surface feeder concern attacks upon grass (43).

Lintner, J. A. 1883. Injurious and other insects. First Annu. Rep. N. Y. State Entomol. 1:99-110.

A life history of the bronzed cutworm is given. Parasites, distribution and control are discussed (103-104).

Metcalf, C. L. and W. P. Flint. 1962.

Destructive and useful insects. 4th Edition. McGraw-Hill Book Co., Inc., N. Y. 1087 pp.

A brief description of the bronzed cutworm larvae is given (478). Control measures on corn are given (479).

Middleton, M. S. 1913. Cutworms and their control. Proc. Entomol. Soc. Br. Columbia. 3:36-37.

It seems that after an outbreak of pests there is a period of decline which is caused by parasites. Nephelodes minians is one of the common species to be found in the Interior of British Columbia (36-37).

Muesebeck, C. F. W. 1920. A revision of the North American species of Ichneumon-flies belonging to the genus Apanteles. Proc. U. S. Nat. Mus. 58:483-576.

Nephelodes emmedonia form violans Guenée acts as a host for Apanteles rufocoxalis. The cocoons of this parasite are "gregarious, completely embedded in a fluffy ball of pale buff silk" (544).

Perkins, G. H. 1894. .Report of the entomologist. Seventh Annu. Rep. Vt. Agr. Exp. Sta. 2:1-151.

Included in this article is a description of size and color ranges of the bronzed cutworm. Bronzed cutworms are found mostly year round. Nephelodes minians occur abundantly in this region (142-143).

Pierstorff, A. L. and T. H. Parks. 1931. Cutworms. Plant disease and insect notes. Ohio State Univ. Ext. Ser. 2(2):1-4.

During the spring of 1925 and again in 1926 there was a severe outbreak of the bronze cutworm, Nephelodes emmedonia Cramer in central Ohio (3).

Riley, C. V. 1880. Bluebirds feeding on parasitic and predaceous insects. Amer. Entomol. Mag. 3:204-205.

A rather large species commonly found in the United States. Since the larva was found full-grown when spring comes, it was assumed that the bronzed cutworm passes the winter in the larval state.

Riley, C. V. 1881. Supposed armyworm in New York and other eastern states. Amer. Naturalist. 15:574-577.
There seem to be two different species concerned in this work. The principal and larger one is the larva of Nephelodes violans Gn. Commonly the bronzed cutworms are found all over the eastern portion of the United States (574).

Smith, J. B. 1893. Catalogue of the lepidopterous superfamily Noctuidae found in boreal America. Bull. U. S. Nat. Mus. 44:1-424.

"N. minians Gn.*

1852. Gn., Spec. Gen., Noct., I, 130, Nephelodes.
1856. Wlk., C. B. Mus., Het., IX, 163, Nephelodes.
1878. French, in 7th Rept. Ins. Ills., 99, 220, larva.
1878. French, Can. Ent., X, 61, larva.
1880. Riley, Amer. Ent., III, 205, larva.
1881. Riley, Amer. Nat., XV, 575, 577, larva.
1883. Lint., 1st Rept. State Ent., N. Y., 99, ff. 24, 25, life history. expansa Wlk.
1857. Wlk., C. B. Mus., Het., XI, 399, Graphiphora.
1865. Wlk., C. B. Mus., Het., XXXV, 1957, pr. syn.
1868. G. and R., Trans. Am. Ent. Soc., II, 78, pr. syn. sobria Wlk.

1857. Wlk., C. B. Mus., Het., XI, 744, Graphiphora.
var. violans Gn.
1852. Gn., Spec. Gen., Noct., I, 130, Nephelodes.
1856. Wlk., C. B. Mus., Het., IX, 163, Nephelodes.
1882. Grt., New List, 29, pr. var. subdolens Wlk.
1857. Wlk., C. B. Mus., Het., X, 405, Graphiphora.
Habitat. - Canada; United States generally; Eastern states in August and Sept.; Colorado, August to Oct.
The types of all the names are in the British Museum.
G. expansa Wlk., I did not find; but as Walker has himself referred it as a synonym, he may have removed the label - or what is equally possible, I overlooked the specimen, though I found all the others referable here.
G. sobria is from Bogota, while subdolens is from 'locality unknown'."(172).

Smith, R. C. and Kelly, E. G. 1939. The eighth annual insect population summary of Kansas, covering the year 1938. Kan. Acad. Sci. Trans. 42:303-323.
Bronzed cutworms appeared a month earlier than usual in blue grass. A wilt disease left few survivors (314-315).

Steinhaus, E. A. 1946. Insect microbiology. Comstock Publishing Company, Ithaca, New York. 763 pp.
This is a textbook as well as a reference. Hosts' occurrence, location on or in host, nature of association, morphology, staining, and pathogenicity to insects are some of the areas covered in this book.

Steinhaus, E. A. 1949. Principles of insect pathology. McGraw - Hill Book Company. New York. 757 pp.

This is a textbook for graduate students and a collation for research workers. There is a plate showing a Nephelodes emmedonia larva infected with Spicaria farinosa on page 407. A definite diagnosis of "polyhedral disease" in the bronzed cutworm has been made in Ohio, according to J. S. Houser (470).

Steinhaus, E. A. 1957. New records of insect-virus diseases. Hilgardia 26(7):417-430.

In 1956 the double infection (a granulosus and a polyhedrosis virus) was found in larvae of the bronzed cutworm, Nephelodes emmedonia. This is the first record of a granulosus virus in the bronzed cutworm. At this point we can only assume that it represents two viruses infecting a single host at the same time (421).

Thurston, R., G. M. Boush and K. Starks. 1957. Control of the bronzed cutworm. 69th. Annu. Rep. Ky. Agr. Exp. Sta.:89.

This article gives information on the control of the bronzed cutworm. A large plot (3/4 acre) unreplicated field test was conducted utilizing 5 insectidical treatments on an established bluegrass sod field against the last instar of the bronzed cutworm, Nephelodes emmedonia (Cram.). Endrin was most effective, followed by dieldrin and isodrin (89).

Tietz, H. M. 1951. The Lepidoptera of Pennsylvania. A manual. Agr. Exp. Sta. State College, Penn. Bull.:1-194.

References to original descriptions, faunal zones, life history and food plants of the bronzed cutworm are given (61-62).

Twinn, C. R. 1942. A summary of the more important crop pests in Canada in 1941. Annu. Rep. Entomol. Soc. Ont. 72:47-59.

There were local outbreaks of bronzed cutworms in bent grass in New Brunswick (49).

Twinn, C. R. 1943. A summary of the more important pests in Canada in 1942. Annu. Rep. Entomol. Soc. Ont. 73:64-70. Vegetable gardens and field crops were attacked by these cutworms which included the bronzed cutworm (Nephelodes emmedonia) (64-70).

UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATIVE ECONOMIC INSECT REPORT[1]

The Bureau of Entomology of the United States Department of Agriculture, in cooperation with the State Entomologists, Entomologists of the Agricultural Experiment Stations, State Departments of Agriculture, Agricultural Colleges and other entomological agencies organized an Insect Pest Survey in 1921. This survey attempted to assemble and disseminate all data on the distribution, seasonal and regional fluctuation of insect abundance, weather data as related to insect outbreaks, phenological data and other miscellaneous information. Each year an annual digest of the important facts gathered during the past season was published in the form of Insect Pest Summaries.

From 1921 to 1950 this publication was entitled "The Insect Pest Survey Bulletin." This was not bound or indexed for the years 1942-1949. In 1951 the Bulletin was replaced by the "Cooperative Economic Insect Report" Vol. 1., No. 1

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[1] Issued by Plant Protection and Quarantine Programs, Animal Health Inspection Service, U. S. Department of Agriculture.

on July 31, 1951. No explanation is given in this publication for the name change.

1921. U. S. Dep. Agr. Insect Pest Surv. Bull. 1.
The bronzed cutworm was present in large numbers in grasslands on Long Island, N. Y., but was apparently not doing much damage (45).

1925. U. S. Dep. Agr. Insect Pest Surv. Bull. 5.
The bronzed cutworm was among the most abundant cutworms found in Iowa (100) and was found on pasture grass in Ohio (158).

1929. U. S. Dep. Agr. Insect Pest Surv. Bull. 9.
Indications point to a repetition during 1929 of the outbreak of the bronzed cutworm, Nephelodes emmedonia Cram., in the Tantramar Marshes, New Brunswick, where last year it destroyed 2,000 acres of hay crop (53).

1931. U. S. Dep. Agr. Insect Pest Surv. Bull. 11.
The bronzed cutworm was found to be abundant in Missouri (163) and the north central states (653).

1932. U. S. Dep. Agr. Insect Pest Surv. Bull. 12.
The bronzed cutworm was very abundant and destroyed about 3 acres of bluegrass pasture in Harrison County, Ohio (131).

1936. U. S. Dep. Agr. Insect Pest Surv. Bull. 16.
The bronzed cutworm was reported from Aurora, Indiana, on May 19 as damaging bluegrass but not attacking any adjoining crops (99).

1937. U. S. Dep. Agr. Insect Pest Surv. Bull. 17.
The bronzed cutworm damaged corn in Virginia (217).

1938. U. S. Dep. Agr. Insect Pest Surv. Bull. 18.
The bronzed cutworm was found to be destroying bluegrass pasture in Ohio (152) and was found in South Haven, Michigan (153).

1939. U. S. Dep. Agr. Insect Pest Surv. Bull. 19.
The bronzed cutworm was reported to be killing bluegrass pasture at New Philadelphia, Ohio (120).

1940. U. S. Dep. Agr. Insect Pest Surv. Bull. 20.
The bronzed cutworm was moderately abundant in fields of hay and on foliage of trees at Perham and Preston, Minnesota (226).

1941. U. S. Dep. Agr. Insect Pest Surv. Bull. 21.
The bronzed cutworm was reported to be present in Connecticut (139), attacked grass in Connecticut (150) and was seen at light in Maine (568).

1952. Coop. Econ. Insect Rep. 2.
The bronzed cutworm (Nephelodes emmedonia) was present in outbreak numbers and caused heavy damage to bluegrass at Dayton, Ohio in mid-May. Outbreaks also occurred in Licking and Coshocton Counties, Ohio during May (445).

1954. Coop. Econ. Insect Rep. 4.
Bronzed cutworm damaged bluegrass pastures in northwest Missouri (426).

1955. Coop. Econ. Insect Rep. 5.
Bluegrass pastures in northwest and to a lesser degree in the central area of Missouri were damaged by the bronzed cutworm (Nephelodes emmedonia) (234).

1956. Coop. Econ. Insect Rep. 6

The bronzed cutworm larvae were very common throughout Illinois (136), occurred in pasture grasses in Missouri (235) and last instars averaging about two per square foot in bluegrass in Kentucky and heavy damage to bluegrass pastures in Missouri (446).

1957. Coop. Econ. Insect Rep. 7.

The bronzed cutworm occurred in heavy numbers and destroyed fields in Missouri (103), caused lesser damage in Clay Co., Mo. (371) and appeared on corn at St. Johns, Michigan (549).

1958. Coop. Econ. Insect Rep. 8.

The bronzed cutworm appeared in a few bluegrass pastures in Clay Co., Mo. (286) and in unusual numbers in the St. Johns area of Newfoundland (971).

1959. Coop. Econ. Insect Rep. 9.

The bronzed cutworm was observed on bluegrass in Illinois (280, 347) on grasses in Ohio (373), on bluegrass in Pennsylvania (403), on grassland near Coshocton, Ohio (478), on pastures in West Virginia (503) and at light traps in New York (836).

1960. Coop. Econ. Insect Rep. 10.

The bronzed cutworm caused damage to bluegrass pastures in Pennsylvania (277), was observed in Illinois (378) and severely damaged bluegrass pastures in Pennsylvania (502).

1961. Coop. Econ. Insect Rep. 11.

The bronzed cutworm was present in bluegrass in Illinois (319), in bluegrass in Missouri (424) and in grassland

at Cow Bay, Nova Scotia (1091).

1962. Coop. Econ. Insect Rep. 12.

The bronzed cutworm was present in bluegrass pastures in Missouri (137), on sugar beets in Minnesota (219), on bluegrass in Missouri (478) and in a lawn in Virginia (514).

1963. Coop. Econ. Insect Rep. 13.

The bronzed cutworm caused damage to lawns in Virginia (169), to bluegrass in Illinois (391), was present in Alabama (427), damaged lawns and pastures in Missouri (483), a bluegrass pasture in Ohio (577), damaged a lawn in Nebraska and pastures in Iowa (607), and lawns in Saskatoon, Saskatchewan (1401).

1964. Coop. Econ. Insect Rep. 14.

The bronzed cutworm caused minor damage to lawns in Nebraska and was abundant in turf in Ohio (163), caused light damage to bluegrass pastures in Missouri (535) and was present at light traps in Ohio (1105).

1965. Coop. Econ. Insect Rep. 15.

Change in spelling: Nephelodes emmedonia to emmedonius (38).

1966. Coop. Econ. Insect Rep. 16.

The bronzed cutworm was notably scarce in the Dartmouth area of Nova Scotia (1150).

1967. Coop. Econ. Insect Rep. 17.

The bronzed cutworm damaged corn in Vermont (139).

1968. Coop. Econ. Insect Rep. 18.

Bronzed cutworm larvae were found in winter wheat in Colorado (274).

1969. Coop. Econ. Insect Rep. 19.

The bronzed cutworm damaged bluegrass in Iowa (395).

Walkden, H. H. 1937. Notes on the life history of the bronzed cutworm in Kansas. J. Kans. Entomol. Soc. 10:52-58.

A discussion of the distribution, economic importance, types of hosts, life cycle, larval habitat, parasites and disease of the bronzed cutworm is given.

Walkden, H. H. 1943. Cutworm and armyworm populations in pasture grasses, wastelands and forage crops. J. Econ. Entomol. 36(3):376-381.

Selection of representative areas for study and the development of testing and collecting methods are discussed. Nephelodes emmedonia attained its greatest density in late April or early May. Bronzed cutworms infested bluegrass and roadside vegetation (379).

Walkden, H. H. 1950. Cutworms, armyworms and related species attacking cereal and forage crops in the Central Great Plains. U. S. Dep. Agr. Circ. 849:1-52.

Distribution, economic importance, food plants, seasonal history, reproductive capacity and natural enemies of the bronzed cutworm are discussed (28).

Walker, F. 1856. List of the specimens of lepidopterous insects in the collection of the British Museum. Part IX:162-163.

A list and a description concerning the species of Nephelodes found in North America are given (163).

Although the following three species are described separately by Walker, they are now considered synonyms of Nephelodes minians Guenee; Nephelodes minians, Nephelodes emmedonia and

Nephelodes violans.

Walker, F. 1857. List of the specimens of lepidopterous insects in the collection of the British Museum. Part X:405. *Graphiphora subdolens* (=*Nephelodes minians*) is described (405).

Walker, F. 1857. List of the specimens of lepidopterous insects in the collection of the British Museum. Part XI:399,744. *Graphiphora expansa* (=*Nephelodes minians*) (399) and *G. sobria* (=*N. minians*) (744-45) are described.

Walker, F. 1865. List of the specimens of lepidopterous insects in the collection of the British Museum. Part 35:1957. "*Nephelodes minians* C. L. H. ix. 163. *Graphiphora expansa* C. L. H. x. 399." (1957). The latter is a synonym of the former.

INDEX

This index was prepared on a computer from cross-indexed keywords. Keywords include geographical location, host plants of the bronzed cutworm, and other keywords such as larval description, parasites, moth illustrations, and synonomy. The Canadian Insect Pest Review is abbreviated as CIPR; the U.S.D.A. Cooperative Economic Insect Report as CEIR; and the U.S.D.A. Insect Pest Survey as IPS.